

Review article

Review of the Genera *Clistopyga* and *Endromopoda* (Hymenoptera: Ichneumonidae: Pimplinae) from South Korea

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ABSTRACT

We reviewed five South Korean species belonging to the genera *Clistopyga* Gravenhorst, 1829 and *Endromopoda* Hellén, 1939, which are recorded for the first time from South Korea: *Clistopyga incitator* (Fabricius, 1793), *Clistopyga sziladyi* Kiss, 1959, *Endromopoda arundinator* (Fabricius, 1804), *Endromopoda detrita* (Holmgren, 1860), and *Endromopoda phragmitidis* (Perkins, 1957). The genus *Clistopyga* can be distinguished from the congeneric species by distinctly upcurved ovipositor, with enlarged hypopygium, and *Endromopoda* by apical perpendicular teeth of ovipositor on apex. Diagnoses, illustrations and keys to South Korean species of the genera *Clistopyga* and *Endromopoda* are provided.

Keywords: Eastern Palaearctic, *Clistopyga*, *Endromopoda*, Ephialtini, taxonomy

INTRODUCTION

Ephialtini Hellén, 1915 is the largest group of the subfamily Pimplinae. This tribe currently includes 963 species within 59 genera worldwide (Yu et al., 2016). Among them, the genus *Clistopyga* Gravenhorst, 1829 is a small group that includes 38 species worldwide, eight of which inhabit the Eastern Palaearctic region: five, three and one have been recorded from Russia, Japan and China, respectively (Yu et al., 2016). Most species of this genus are parasitoids of Lepidoptera, Coleoptera and Araneae species (Hedwig, 1950). Oviposition occurs in the egg sac of the host (Austin, 1985).

The genus *Endromopoda* Hellén, 1939 is small group including 11 species worldwide, including five species in Eastern Palaearctic region: three species have been recorded from Russia, and one from China and Japan. General species of this genus are idiobiont endoparasitoids of Lepidoptera, Hymenoptera, Diptera and Coleoptera (Özbek and Çoruh, 2012). Overwintering occurs as prepupae (Fitton et al., 1988). In this study, we report five newly recorded species: *Clistopyga incitator* (Fabricius, 1793), *C. sziladyi* Kiss, 1959, *Endromopoda arundinator* (Fabricius, 1804), *E. detrita* (Holmgren, 1860), and *E. phragmitidis* (Perkins, 1957). Also, two genera are recorded for the first time from South Korea.

Additionally, we provide diagnoses, illustrations and keys to the South Korean *Clistopyga* and *Endromopoda* species.

MATERIALS AND METHODS

Materials used in this study were collected by sweeping and Malaise trapping, after which they were deposited in the Animal Systematic Laboratory of Yeungnam University (YNU, Gyeongsan, South Korea). Morphological terminology mainly follows that of Townes (1969). Specimens were examined using an AxioCam MRc5 camera attached to a stereo microscope (Zeiss Stereo Discovery, V20; Carl Zeiss, Göttingen, Germany), processed and optimized using Axio-Vision SE64 software (Carl Zeiss). Distributional data follows that of Yu et al. (2016). Species diagnoses mainly are based on South Korean specimens.

Abbreviations for collections are as follows: ANSP, Academy of Natural Sciences of Philadelphia, Philadelphia; BNHM, The Natural History Museum, London; IZU, Institut Zoologiczny Uniwersytetu, Wrocław; KU, Kagoshima University, Kagoshima; LBS, Laboratorium voor Entomologie, Wageningen; NM, Naturhistorisches Museum, Admont; NR, Naturhistoriska Riksmuseet, Stockholm; TMA, Termes-

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zettudomanyi Muzeum Allattara, Budapest; UZM, Universitets Zoologiske Museum, Copenhagen; ZIN, Zoological Institute, Academy of Sciences, St. Petersburg; ZIU, Zoolo- gisches Institut der Universität, Halle; ZMHU, Zoologisches Museum (Museum für Naturkunde), Humboldt Universität, Berlin; ZS, Zoologisches Staatsammlung, München.

Abbreviations of South Korean provinces and indices used in the paper as follows: CB, Chungcheongbuk-do; GB, Gyeongsangbuk-do; GG, Gyeonggi-do; GN, Gyeong- sangnam-do; GW, Gangwon-do; TD, type depository; TL, type locality; TS, type species.

SYSTEMATIC ACCOUNTS

Order Hymenoptera Linnaeus, 1758

Family Ichneumonidae Latreille, 1802

Subfamily Pimplinae Wesmael, 1845

Tribe Ephialtini Hellén, 1915

^{1*}Genus *Clistopyga* Gravenhorst, 1829

Pimpla (*Clistopyga*) Gravenhorst, 1829: 132. TS: *Ichneumon incitator* Fabricius.
Hymenomacropyga Uchida, 1941: 116. TS: *Hymenomacropyga latifrontalis* Uchida.
Ichneumonoglypta Blanchard, 1941: 9. TS: *Ichneumonoglypta lopezrichinii* Blanchard.

Diagnosis. Ovipositor tapered only apex, distinctly long and upcurved, with enlarged hypopygium (Fig. 2A, F). On male, behind area of malar space with a groove bounded by a ridge. Vein between intercubitella and subcostella of male longer than intercubitella (Figs. 1, 2E). Flagellomere of male without tyloid.

Key to species of the genus *Clistopyga* from South Korea

1. Inner orbits of frons and basal area of vertex with yellow longitudinal marks (Fig. 1B). Hind femur entirely reddish brown. Hind tibia black, except white marks on basal and median area (Fig. 1D). *C. incitator*
- Inner orbits of frons and basal area of vertex mainly black, except yellow circular marks of vertex on female (Fig. 2B). Hind femur and hind tibia reddish brown, except apical area black (Fig. 2D). *C. sziladyi*

^{2*}*Clistopyga incitator* (Fabricius, 1793) (Fig. 1)

Ichneumon incitator Fabricius, 1793: 172. Lectotype: ♀, TL: Germany, TD: UZM.

Clistopyga haemorrhoidalis Gravenhorst, 1829: 135. Type: ♀, TL: Italy, TD: lost.

Polysphincta elegans Ratzeburg, 1848: 101. Type: ♀, TL: Germany, TD: lost.

Glypta albicoxa Walker, 1874: 304. Type: ♀, TL: Japan, TD: BNHM.

Clistopyga sauberi Brauns, 1898: 58. Lectotype: ♀, TL: Germany, TD: ZMHU.

Clistopyga incitatrix Schulz, 1906: 103. Emendation for *Ichneumon incitator* Fabricius, 1793.

Polysphincta excavata Telenga, 1930: 104. Type: ♂, TL: Russia-Sankt Petersburg, TD: ZIN.

Clistopyga temporalis Hellén, 1949: 11. Type: unknown, TL: Spain-Canary Islands, TD: unknown.

Material examined. South Korea: Busan: 1♀, Saha-gu, Hadan-dong, Eulsuk island, 9 Oct 2015, Lee JW.

Diagnosis. Body black, with whitish brown to reddish black marks on head, mesosoma and legs (Fig. 1A). Flagellum brown, except entire scape, dorsal area of pedicel to 2nd flagellomere black. Face subpolished, strongly convex on median area and densely punctate, with dense hairs; inner orbits and upper area relatively sparsely punctate (Fig. 1B). Frons subpolished and sparsely punctate, with sparse hairs (Fig. 1B). Vertex polished, relatively and sparsely punctate, with hairs and whitish brown marks. Mesoscutum subpolished and relatively densely punctate, with dense hairs; notauli distinct, extending to mid area. Propodeum subpolished and relatively densely punctate, with dense hairs; basal, first lateral, petiolar and third lateral area sparsely punctate; areola slightly wrinkled; basal area with longitudinal groove; propodeal spiracle circle shaped; costula absent; median longitudinal carinae indistinct, extending to mid area (Fig. 1C). Hind wing with three distal hamuli; vein between intercubitella and subcostella as long as intercubitella; nervellus intercepted by discoidella at lower area (Fig. 1E).

Distribution. South Korea (new record), Algeria, Austria, Belarus, Belgium, Bulgaria, China, Czech Republic, Finland, France, Germany, Hungary, Iran, Ireland, Israel, Italy, Kenya, Macedonia, Moldova, Mongolia, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Ukraine, United Kingdom, Yugoslavia.

Region. Afrotropical, Eastern Palaearctic, Western Palaearctic.

^{3*}*Clistopyga sziladyi* Kiss, 1959 (Fig. 2)

Clistopyga sziladyi Kiss, 1959: 416. Type: ♀, TL: Hungary, TD: TMA.

Korean name: ^{1*}굽은꼬리납작맵시벌속(신칭), ^{2*}무늬굽은꼬리납작맵시벌(신칭), ^{3*}검정굽은꼬리납작맵시벌(신칭)

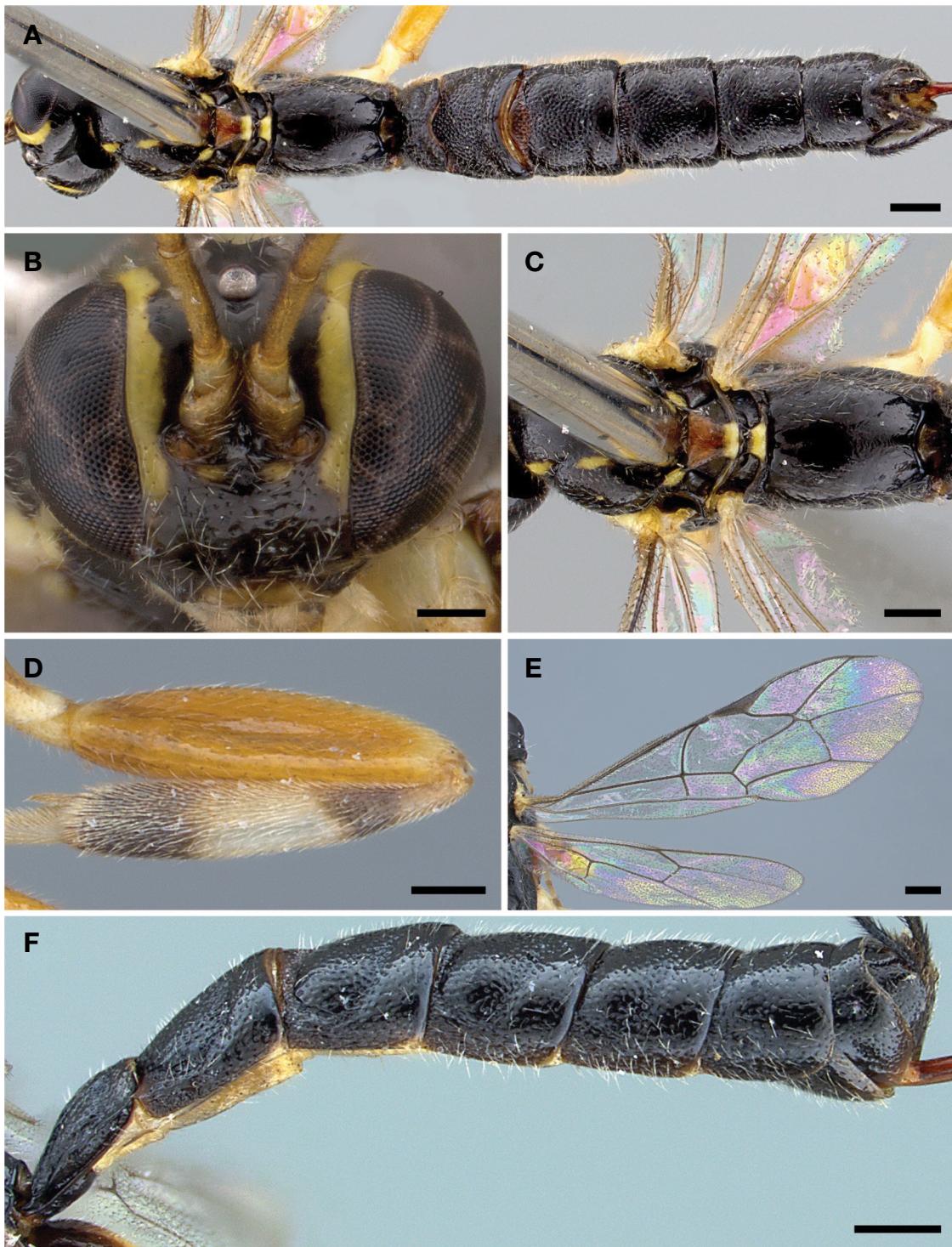


Fig. 1. *Clistopyga incitator* (Fabricius, 1793), female. A, Habitus in dorsal view; B, Head in frontal view; C, Mesonotum in dorsal view; D, Hind femur to tibia in lateral view; E, Wings; F, Tergites in lateral view. Scale bars: A-F=0.2 mm.

Clistopyga nagatomii Kusigemati, 1984: 131. Holotype: ♀, TL: Thailand, TD: KU.

Material examined. South Korea: GB: 1♀, Gyeongsan-si, Sampung-dong, Samcheonji, 5 Aug 1986, Lee JW; 1♂, Ul-reung-gun, Seo-myeon, Namyang-ri, Namyangcheon, 16

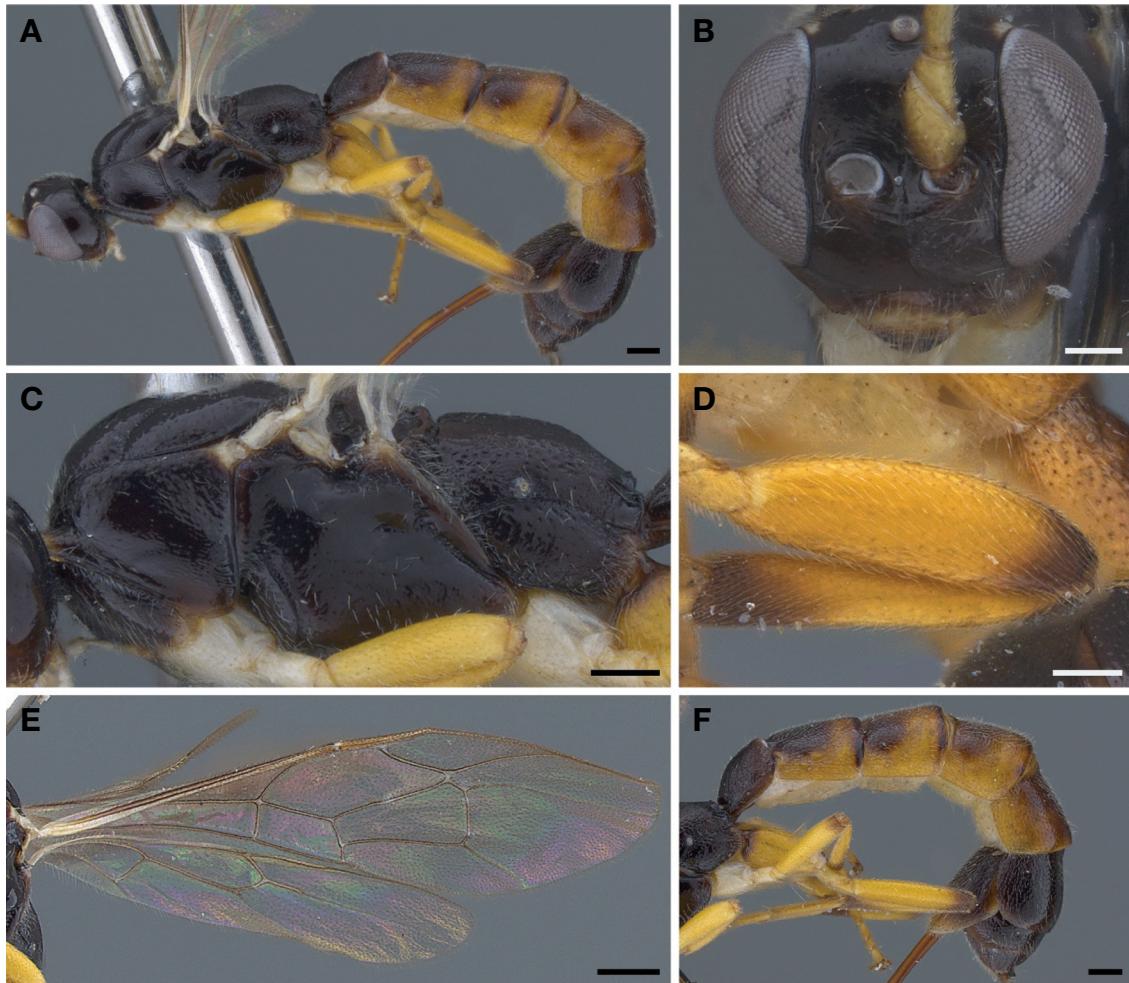


Fig. 2. *Clistopyga sziladyi* Kiss, 1959, female. A, Habitus in lateral view; B, Head in frontal view; C, Mesonotum in lateral view; D, Hind femur to tibia in lateral view; E, Wings; F, Tergites in lateral view. Scale bars: A-F=0.2 mm.

Oct 2001, Kim KB; GN: 1♂, Jinju-si, Gajwa-dong, 28 Jul 1987, Kim JG; 1♀, ditto, 2-8 Sep 1989, Kim ES.

Diagnosis. Body black, with white to reddish black marks on head, mesosoma, metasoma and legs (Fig. 2A). Flagellum yellowish brown, except dorsal area of 1st to 6th flagellomeres dark brown. Face subpolished and weakly convex on median area and densely punctate, with dense hairs; inner orbits and apical area relatively sparsely punctate (Fig. 2B). Frons subpolished, relatively and sparsely punctate, with sparse hairs (Fig. 2B). Vertex polished and sparsely punctate, with sparse hairs; subbasal inner orbits beyond compound eye with whitish brown marks. Mesoscutum polished and densely punctate, with dense hairs; notauli distinct, extending to mid area. Propodeum subpolished and densely punctate, with dense hairs; areola weakly rugose; petiolar,

second pleural, third lateral and third pleural area relatively sparsely punctate; propodeal spiracle circle shaped; costula absent; median longitudinal carinae indistinct, extending to basal area. Hind wing with five distal hamuli; vein between intercubitella and subcostella as long as intercubitella; nervellus intercepted by discoidella at lower area (Fig. 2E).

Distribution. South Korea (new record), Belarus, France, Hungary, India, Russia, Thailand, Ukraine.

Region. Eastern Palaearctic, Oriental, Western Palaearctic.

^{1*}Genus *Endromopoda* Hellén, 1939

Scambus (*Endromopoda*) Hellén, 1939: 56. TS: *Pimpla melanopyga* Gravenhorst.

Diagnosis. Scape usually dark, with a white mark (Figs. 4,

Korean name: ^{1*}긴배납작맵시벌속(신칭)

5B). Propodeum with long and closely positioned median longitudinal carinae (Fig. 4A). 1st tergite elongate, 1.5–2 times as long as wide (Figs. 3, 4, 5F). Distinctly compressed ovipositor, with the apical teeth perpendicular to the ovipositor apex (Figs. 3, 4, 5G).

Key to species of the genus *Endromopoda* from South Korea

1. 1st to 6th tergites usually reddish brown (Fig. 3F). Ovipositor 0.8–0.9 times as long as hind tibia, slightly up-curved; lower valve with five to six apical teeth (Fig. 3G). Fore femur without ventral excavation on male (Fig. 3C). *E. arundinator*
- 1st to 6th tergites mainly black, sometimes reddish black (Figs. 4, 5F). Ovipositor 1.1–1.6 times as long as hind tibia, more or less straight; lower valve with seven or more apical teeth (Figs. 4, 5G). Ventral area of fore femur with excavation on male (area indicated by arrow shaped mark) (Figs. 4, 5C). 2
2. Ovipositor 1.1–1.3 times as long as hind tibia. Fore femur with an elongated ventral excavation on male (area indicated by arrow shaped mark) (Fig. 4C). *E. detrita*
- Ovipositor 1.4–1.6 times as long as hind tibia. Fore femur with two ventral excavations on male (area indicated by arrow shaped mark) (Fig. 5C). *E. phragmitidis*

^{1*}*Endromopoda arundinator* (Fabricius, 1804) (Fig. 3)

Pimpla arundinator Fabricius, 1804: 916. Lectotype: ♀, TL: Austria, TD: UZM.

Pimpla melanopyga Gravenhorst, 1829: 149. Type: ♀, TL: unknown, TD: lost.

Pimpla variabilis Holmgren, 1856: 88. Lectotype: ♀, TL: Sweden, TD: NR.

Pimpla erythrosoma Rudow, 1883: 236. Type: unknown, TL: Germany, TD: lost.

Pimpla (Epiurus) nitida Brauns, 1898: 58. Lectotype: ♀, TL: Germany, TD: ZMHU.

Pimpla interruptecallosa Strobl, 1902: 3. Type: ♀, TL: Austria, TD: NM.

Pimpla arundinatrix Schulz, 1906: 104. Emendation for *Pimpla arundinator* Fabricius, 1804.

Pimpla melanopyga nigricans Ulbricht, 1913: 8. Type: unknown, TL: unknown, TD: unknown.

Epiurus culpator Morley, 1914: 83. Lectotype: ♀, TL: United Kingdom, TD: BNHM.

Pimpla melanopyga crefeldensis Strand, 1918: 156. New name for primary homonym *Pimpla melanopyga nigricans* Ulbricht, 1913.

Material examined. South Korea: GG: 1♂, Ganghwa-gun, Hwado-myeon, Yeocha-ri, Salt marsh, 11 Aug 1991, Park HC; Seoul: 1♀, Mapo-gu, Mangwon-dong, 31 May 1996, Eom MH.

Diagnosis. Body almost black, except yellow to reddish brown area on head, mesosoma, metasoma and legs (Fig. 3A). Flagellum brown, except scape and pedicel dark brown. Fore leg yellowish brown except basal to subapical area of femur, apical area of 1st to 3rd tarsomeres, entire 4th tarsomere and basal area of tarsal claw brown; apical area of tarsal claw reddish black (Fig. 3A). Face subpolished and sparsely punctate, with sparse hairs, except median upper area relatively densely punctate; mid area distinctly convex (Fig. 3B). Metapleuron subpolished, distinctly and densely punctate, with dense hairs; upper area relatively sparsely punctate (Fig. 3A). Propodeum subpolished, distinctly and densely punctate, with dense hairs, except petiolar and third lateral area relatively sparsely punctate; areola rugose; propodeal spiracle circle shaped; costula absent; median longitudinal carinae indistinct, extending to subapical area. Hind wing with seven distal hamuli; vein between intercubitalia and subcostella slightly longer than intercubitalia; nervellus intercepted by discoidella on median area (Fig. 3D).

Distribution. South Korea (new record), Algeria, Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Czech Republic, Finland, France, Germany, Hungary, Iran, Ireland, Italy, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Spain, Sweden, Turkey, Ukraine, United Kingdom, Uzbekistan, Yugoslavia.

Region. Eastern Palaearctic, Western Palaearctic.

^{2*}*Endromopoda detrita* (Holmgren, 1860) (Fig. 4)

Ichneumon punctator Müller, 1766: 196. Type: unknown, TL: Italy, TD: unknown.

Ichneumon inanis Schrank, 1802: 295. Neotype: ♂, TL: Germany, TD: ZS.

Ichneumon rayellae Schrank, 1802: 295. Type: ♂, TL: Czechoslovakia, TD: lost.

Pimpla detrita Holmgren, 1860: 23. Type: unknown, TL: Sweden, TD: NR.

Pimpla gravenhorstii Taschenberg, 1863: 266. Lectotype: ♀, TL: Germany, TD: ZIU.

Pimpla indagatrix Cresson, 1870: 146. Lectotype: ♂, TL: U.S.A.-Illinois, TD: ANSP.

Pimpla laevidorsum Vollenhoven, 1873: 213. Type: ♀, TL: Netherlands, TD: LBS.

Pimpla brunnea Brischke, 1880: 112. Lectotype: ♀, TL: Italy, TD: IZU.

Pimpla nigricoxis Ulbricht, 1910: 7. Type: ♀, TL: Germany,

Korean name: ^{1*}붉은긴배납작맵시벌(신칭), ^{2*}홈긴배납작맵시벌(신칭)

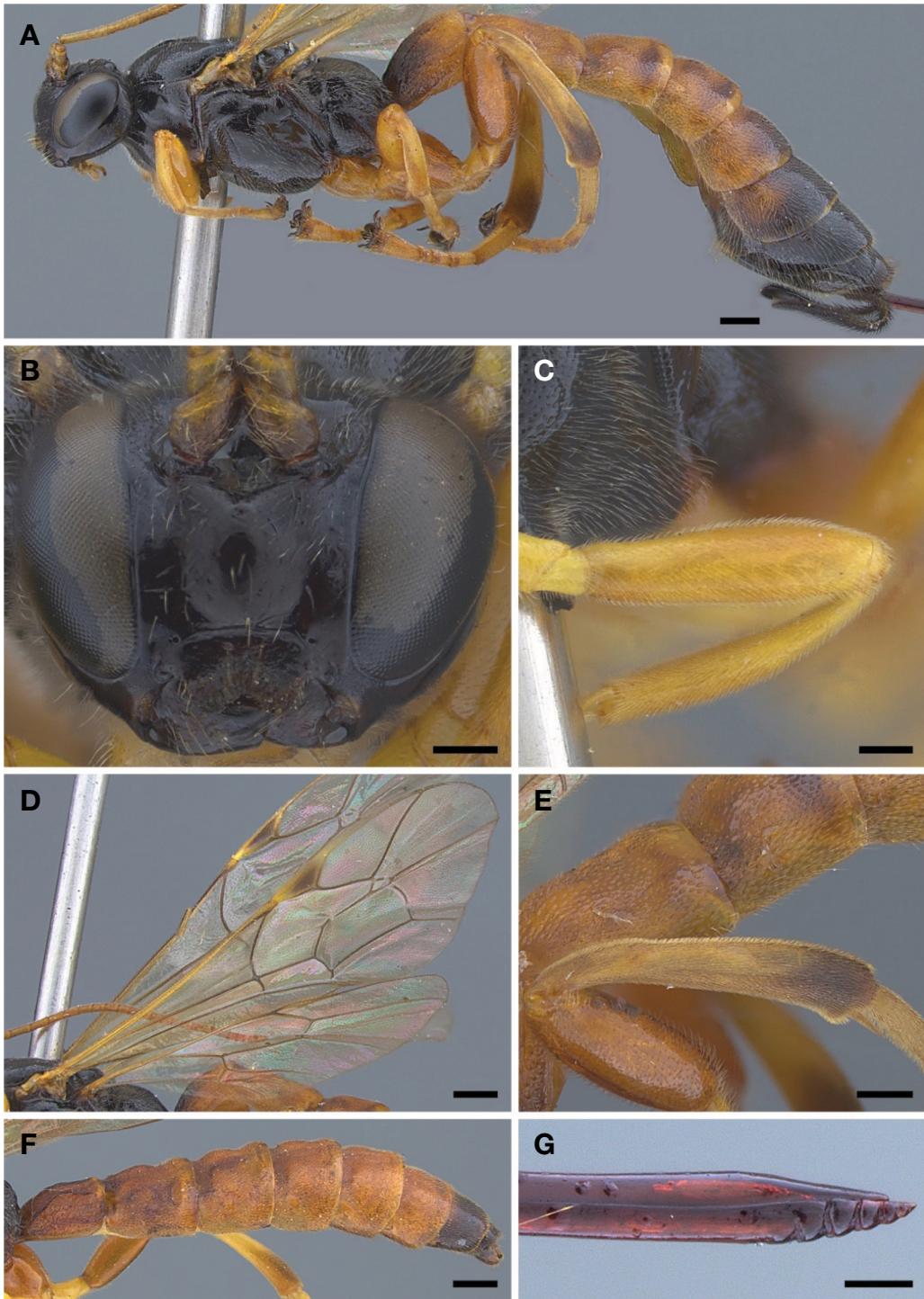


Fig. 3. *Endromopoda arundinator* (Fabricius, 1804), female. A, Habitus in lateral view; B, Head in frontal view; C, Fore femur of male in lateral view; D, Wings; E, Hind tibia in lateral view; F, Tergites of male in lateral view; G, Apex of ovipositor in lateral view. Scale bars: A-G=0.2 mm.

TD: ZMHU.

Material examined. South Korea: CB: 1♂, Chungju-si,

Sangmo-myeon, Mt. Wolaksan, 4 Sep 1997, Ahn SB; GB: 1♂, Gyeongsan-si, Daehak-ro, 280, Yeungnam Univ., 8 Apr 1987, Cha JY; GN: 1♂, Tongyeong-si, Hansan-myeon,

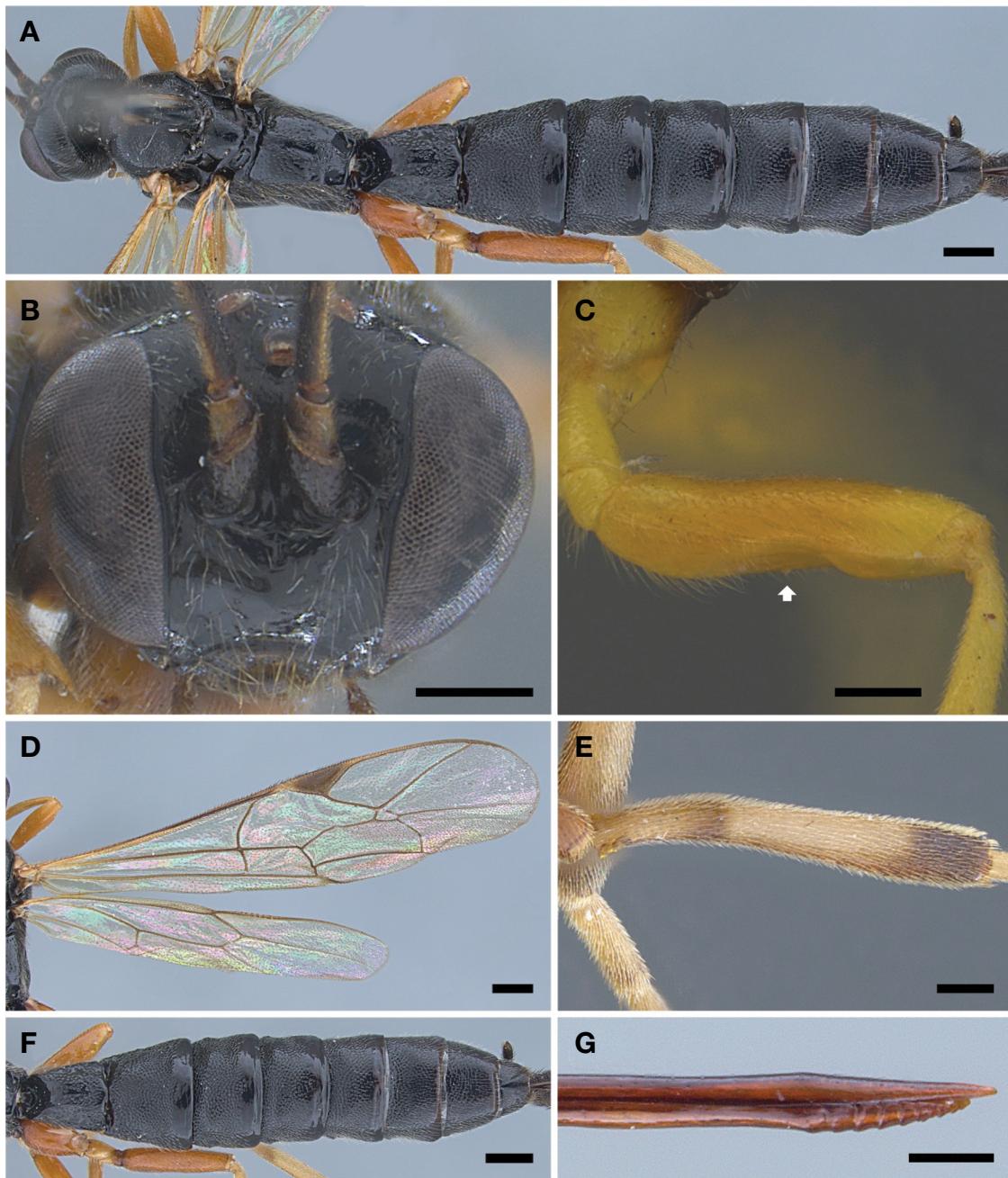


Fig. 4. *Endromopoda detrita* (Holmgren, 1860), female. A, Habitus in dorsal view; B, Head in frontal view; C, Fore femur of male in lateral view (area indicated by arrow shaped mark); D, Wings; E, Hind tibia in lateral view; F, Tergites in dorsal view; G, Apex of ovipositor in lateral view. Scale bars: A-G=0.2 mm.

Bijin-ri, Bijin island, Mountain near Eoi Hang gil, 25 Apr 2008, Park HC; GW: 1♀, Cheolwon-gun, 1 Oct 1972, Kim CH; 1♀, Goseong-gun, Ganseong-eup, Geonbongsa temple, 22 May 1992, Lee JW; 1♀, Goseong-gun, Ganseong-eup, Jinburyeong, 13 May 1992, Ryu SM; 1♀, Taebaek-si, Mt. Yeonhwasan, 14 May 1997; Bulgaria: 1♀, Strandja, Vitanova, 27 Jul 2000, J Kolarov.

Diagnosis. Body mainly black, except whitish brown to reddish black area on head, mesosoma, metasoma and legs (Fig. 4A). Flagellum brown, except scape, dorsal area of pedicel to 9th flagellomere black. Fore leg whitish brown except coxa, basal to subapical area of femur, subapical area of tibia yellowish brown; apical area of 1st to 2nd tarsomeres, basal area of 3rd tarsomere, entire 5th tarsomere and basal

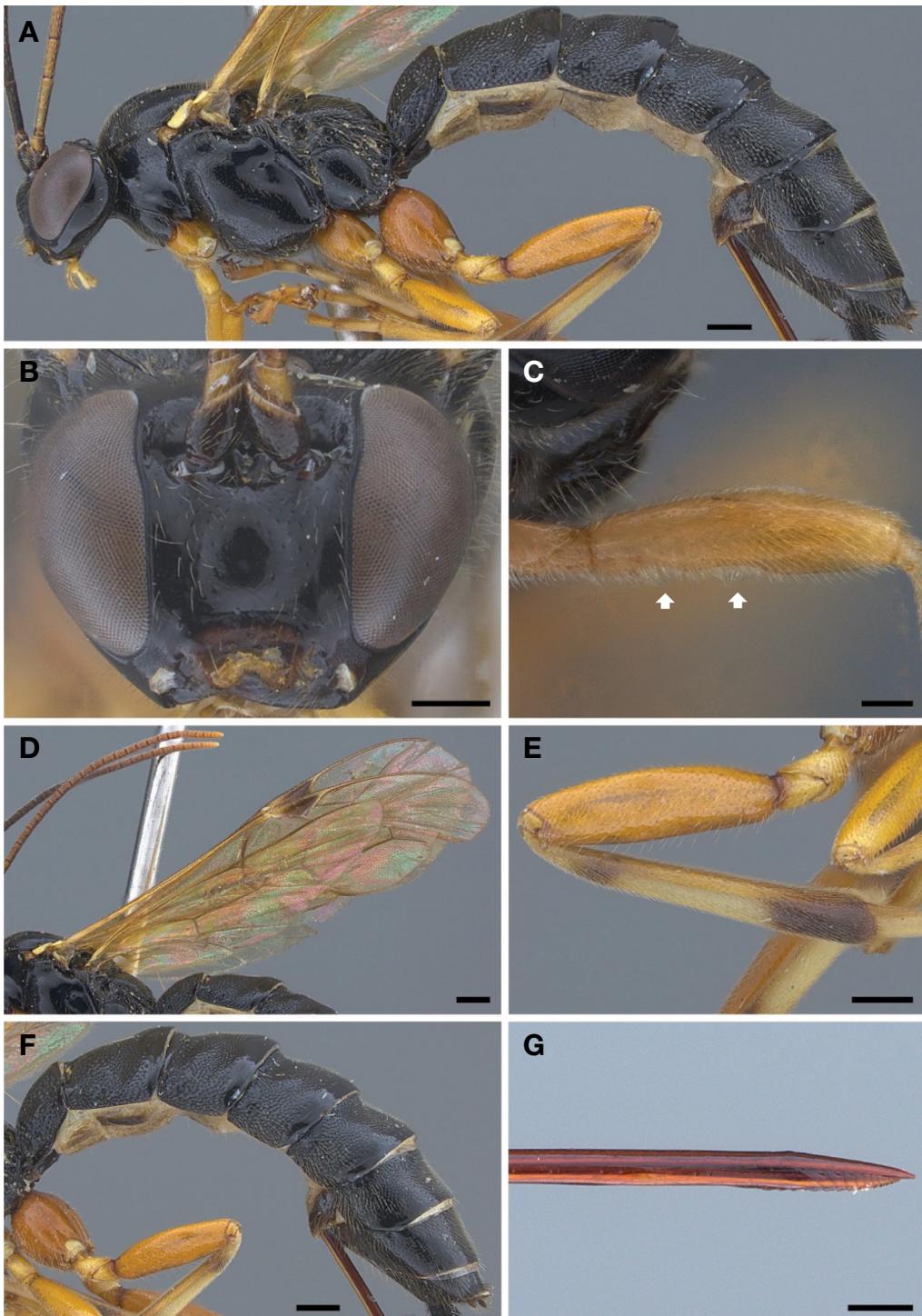


Fig. 5. *Endromopoda phragmitidis* (Perkins, 1957), female. A, Habitus in lateral view; B, Head in frontal view; C, Fore femur of male in lateral view (area indicated by arrow shaped mark); D, Wings; E, Hind tibia in lateral view; F, Tergites in lateral view; G, Apex of ovipositor in lateral view. Scale bars: A-G=0.2 mm.

area of tarsal claw brown; apical area of tarsal claw reddish black. Face subpolished, relatively and sparsely punctate, with hairs; median area smooth and weakly convex (Fig.

4B). Metapleuron subpolished, relatively sparsely punctate, with hairs; lower area smooth. Propodeum subpolished, relatively and densely punctate, with hairs; petiolar and third

lateral area sparsely punctate; propodeal spiracle circle shaped; costula absent; median longitudinal carinae indistinct, extending to subapical area (Fig. 4A). Hind wing with seven distal hamuli; vein between intercubitella and subcostella slightly longer than intercubitella; nervullus intercepted by discoidella on lower area (Fig. 4D).

Distribution. South Korea (new record), Austria, Azerbaijan, Belarus, Belgium, Bulgaria, Canada, China, Croatia, Czech Republic, Denmark, Finland, France, Georgia, Germany, Hungary, Iran, Ireland, Italy, Latvia, Lithuania, Moldova, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, Turkey, U.S.A., Ukraine, United Kingdom, Yugoslavia.

Region. Eastern Palaearctic, Nearctic, Oriental, Western Palaearctic.

^{1*}*Endromopoda phragmitidis* (Perkins, 1957) (Fig. 5)

Ephialtes (Scambus) phragmitidis Perkins, 1957: 2. Type: ♀, TL: United Kingdom, TD: ZNHM.

Scambus detrita rufipes Aubert, 1963: 94. Type: ♀, TL: France, TD: unknown.

Material examined. South Korea: GB: 1♀, Gyeongsan-si, Daehak-ro, 280, Yeungnam Univ., 14 Oct 1986, Lee JW; 1♂, Mt. Bonghwasan, 4 May 1997, Ryu SM; GW: 1♀, Inje-gu, Girin-myeon, Bangdong-ri, Mt. Bangtaesan, Jogyeong-dong, 16 Aug 1995, Lee JW.

Diagnosis. Body mainly black, except whitish brown to reddish black area on head, mesosoma, metasoma and legs (Fig. 5A). Flagellum brown, except basal to subapical area of scape, dorsal area of pedicel to 15th flagellomere black; apical area of scape whitish brown. Fore leg whitish brown except coxa, median area of femur, apical half area of tibia, 5th tarsomere and basal area of tarsal claw yellowish brown; apical area of tarsal claw reddish black. Face subpolished, relatively and densely punctate, with dense hairs; inner orbit and lower area relatively sparsely punctate; median area weakly convex (Fig. 5B). Metapleuron subpolished, densely punctate, with dense hairs (Fig. 5A). Propodeum subpolished, densely punctate, with dense hairs; areola, basal and petiolar area sparsely punctate; propodeal spiracle circle shaped; costula absent; median longitudinal carinae indistinct, extending to subapical area. Hind wing with six distal hamuli; vein between intercubitella and subcostella slightly longer than intercubitella; nervullus intercepted by discoidella on lower area (Fig. 5D).

Distribution. South Korea (new record), Austria, Belarus, Bulgaria, Czech Republic, Finland, France, Germany, Iran,

Moldova, Mongolia, Montenegro, Norway, Poland, Romania, Serbia, Slovakia, Sweden, Switzerland, Turkey, United Kingdom, Yugoslavia.

Region. Eastern Palaearctic, Western Palaearctic.

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Korean name: ^{1*}두흉진배납작맵시벌(신칭)

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